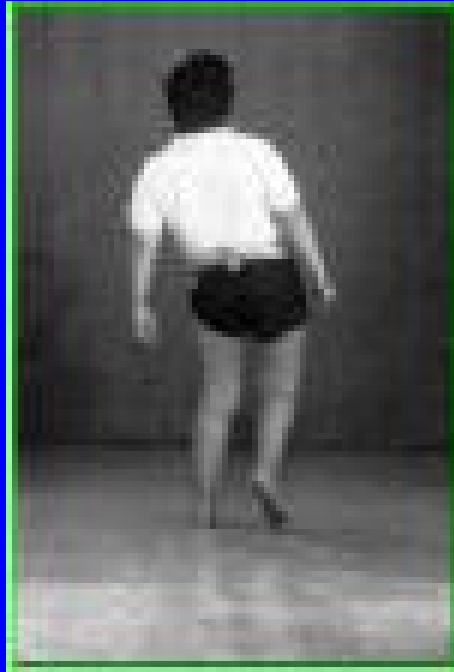


# The Limping Child



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# Studying can be Hazardous



# Objectives

- Review gait types
- **Proper Work Up:**
  - **Potential etiologies**
  - **Use age to narrow differential**
  - **Thorough History and Physical**
  - **Appropriate Test**
- **The Fab Five**

# Basics of Gait Types

- Asymmetric Deviation from the normal gait
- Normal gait pattern:
  - 60% stance
  - 40% swing

Stiffed Leg  
Antalgic Gait

Trendelenberg  
Waddling

- Increased time in the swing phase to avoid bearing weight on the injured extremity

Stooped  
Toe Walking

Steppage  
Slow deliberate

- By age 5 most kids have an adult gait pattern

# Objectives

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- The Fab Five

# Etiologies of the Limping Child

- Trauma:
  - Fracture
  - Dislocation
  - Soft tissue injury
- Inflammatory:
  - Juvenile Rheumatoid Arthritis
  - Osteomyelitis
  - Septic Arthritis
- Tumor:
  - Osteosarcoma
  - Ewing's Sarcoma
- Infection:
  - Cellulitis
- Congenital:
  - Legg-Calve-Perthes
- Developmental:
  - Legg-Calve-Perthes

# Etiologies of the Limping Child

- Trauma:
  - Fracture (Stress, Toddlers') Soft Tissue, Ankle Sprain, Foreign Body, Ingrown toe nail
- Tumor:
  - Spinal Cord, Bone (Benign & Malignant), Lymphoma, Leukemia
- Infection:
  - Cellulitis, Osteomyelitis, Septic Arthritis, Lyme Disease, TB, GC, Postinfectious Reactive Arthritis
- Inflammatory:
  - Juvenile Rheumatoid Arthritis, Transient Synovitis, Systemic Lupus Erythematosus
- Congenital:
  - Hip Dysplasia, Sickle Cell, Short Femur, Club Foot
- Developmental:
  - Legg- Calve-Perthes Disease, Slipped Capital Femoral Epiphysis, Tarsal Coalition, Osteochondral Defect, Neuro

# Potential Etiologies

Juvenile  
Rheumatoid  
Arthritis  
Toxic Synovitis

Legg-Calve-  
Perthes

Slipped Capital Femoral  
Epiphysis

Avascular necrosis

Overuse

Tarsal Coalition

Septic Hip

Hip dysplasia

Occult Fracture

Length Discrepancy

Septic Arthritis

Osteomyelitis

Cellulitis

Stress Fracture

Neoplasm

Neuromuscular

GC Arthritis



# Objectives

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# Age Related Etiologies of the Limping Child

<u>All Ages</u>			
Septic Arthritis			
Osteomyelitis			
Cellulitis			
Stress Fracture			
Neoplasm			SC Arthritis
Neuromuscul			

### **0-3 Years**

Septic Hip  
Hip dysplasia  
Occult Fracture  
Length Discrepancy

### **4-10 Years**

JRA  
Toxic Synovitis  
Legg-Calve-Perthes

### **All Ages**

Septic Arthritis  
Osteomyelitis  
Cellulitis  
Stress Fracture  
Neoplasm  
Neuromuscular

### **11-16 Years**

SCFE  
AVN  
Overuse  
Tarsal Coalition  
GC Arthritis

# Objectives

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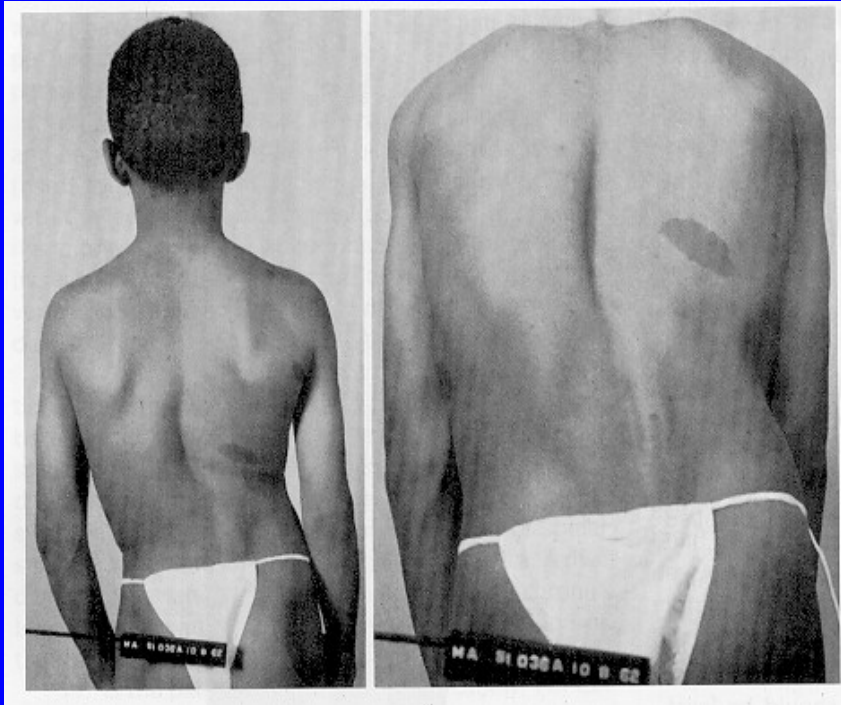
# Proper Work Up: History

- Onset and Type of Pain
  - Improving/Worsening
  - Worse in morning or evening
- Ambulatory or not
  - If younger, will the child crawl
- Review of systems
  - Recent illness
  - Birth and Family History

# Physical Exam

- Walk on toes, heels, hop, and run
- Feet for claw toes or cavus feet
- Deep tendon reflexes and clonus
- HIP EXAM-ROM & SPECIAL TESTS
- Skin and GU/Abdominal Exam

# Limp: Back



# Hip Exam

- Position of maximum volume and least pressure: Flexion, Abduction, Ext Rotation
- Decreased Internal Rotation suggest Hip Pathology
- Place Patient Prone and Comp (most sensitive test)

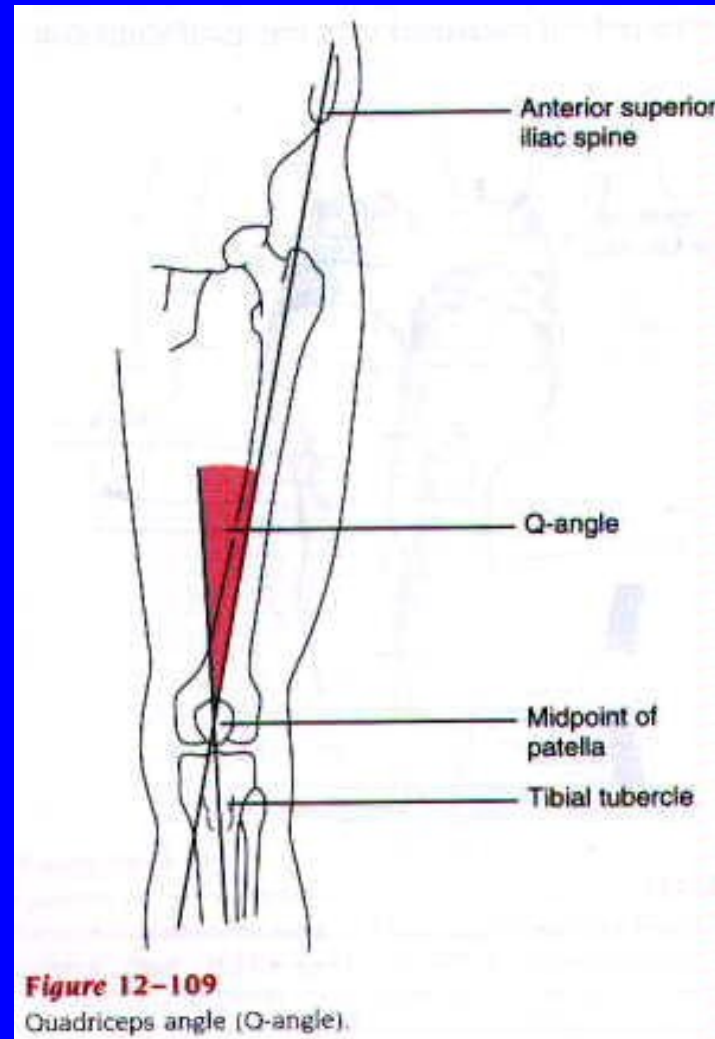


or log roll→





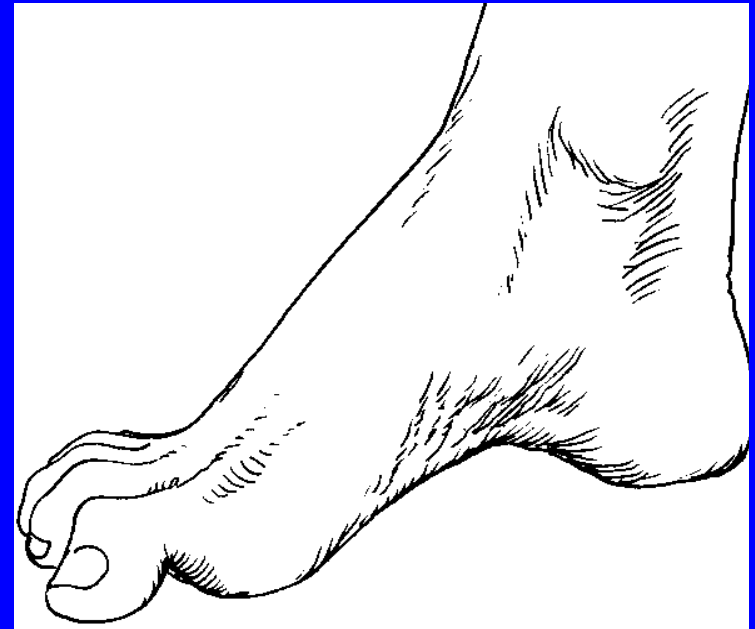
# Limp: Knee



# Limp: Feet



Pes Planus



Pes Cavus

# Objectives

- Review gait types
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# Appropriate Tests: Labs

- CBC If more than 2 cell lines down consider malignancy
- C-Reactive Protein &/or ESR  
CRP More Sensitive and Earlier
- Joint Fluid Cell Count (>50K=infection) and Culture pos 36% - 79%
- Blood Culture Partial Treatment with Antibiotics  
+  $\leq 50\%$
- Lyme Titers/ANA/ RF/HLA

# Appropriate Test: Radiology

- Radiographs
  - Lateral
  - Frog
- Ultrasound
  - Fluid collections
  - Aspiration and Injection
- Bone Scan
- Ortho Consult

# Take Study “BRAKES”



# Objectives

- Review gait types
- Proper Work Up:
  - Potential etiologies
  - Use age to narrow differential
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  - Appropriate Test
- The Fab Five

# The Fab Five





# Five Etiologies of Limp

- Growing Pains  
12-16 years old
- Legg-Calve-Perthes Disease  
4-10 years old
- Slipped Capital Femoral Epiphysis  
11-16 years old
- Toxic Synovitis  
4-10 years old
- Septic Arthritis  
Any age

# Growing Pains

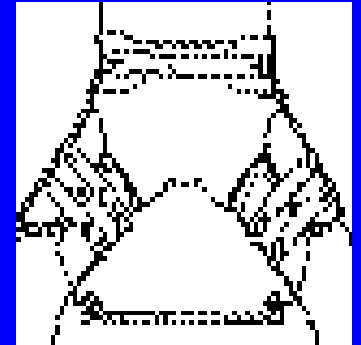
- Reported affect 40-80 %
- Leg Pain is Bilateral, nocturnal
- Etiology
- More common in males
- Supportive treatment, relative rest
- No long term sequelae

# Legg-Calve-Perthes Disease

- “Painless Limp” caused by AVN of femoral head
- Symptoms may be referred to thigh and knee
- Unknown etiology-but there is interrupted blood supply of femoral epiphysis
- 5:1 Male Predominance
- Usually 4-8 years to age

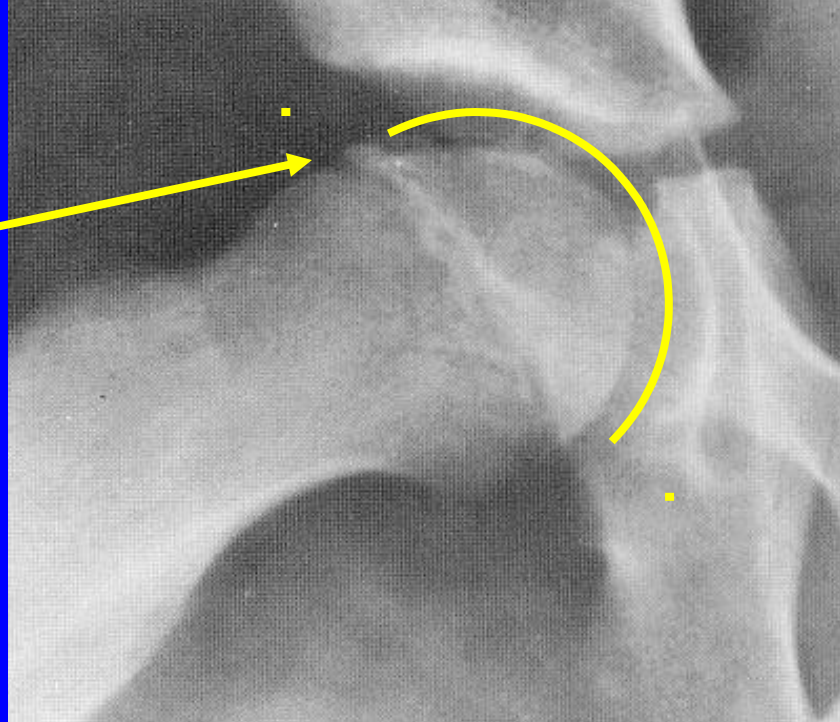
# Legg-Calve-Perthes Disease

- Treatment Key is to containment of femoral epiphysis in acetabulum
- If  $<50\%$  Femoral Head involved Observation
- If  $>50\%$  Femoral Head involved cast, brace or operate
- All suspected and confirmed cases should be referred



# Legg Calve Perthes-Various Xrays

Crescent  
sign



# Slipped Capital Femoral Epiphysis

- Slippage of Proximal Femoral Epiphysis on the Femoral Neck through the Physeal Plate
- Occurs during Adolescent Growth Spurt
- Most Common Hip Disorder of Adolescents (2 /100K)
- Symptoms to Diagnosis 10 months
- Missed on initial exam up to 50 %



# Slipped Capital Femoral Epiphysis

- Male/Female 1.5/1
- Usually Obese or Tall Thin adolescents
- More Common in Blacks and Polynesians
- Only 25% w history of Trauma
- Occurs 25-40% Bilaterally



# Slipped Capital Femoral Epiphysis

- Stable 90% vs. Unstable 10%
- Exam- Decreased Internal Rotation & Obligate Ext Rotation w Hip Flexion
- If severely limited Active ROM, do not test passively until X-rays obtained (may displace epiphysis even further-may need X-table lateral)





# Slipped Capital Femoral Epiphysis



## Surgical Pinning



# Toxic Synovitis

- Most Common Cause of Hip Pain under 10
- Diagnosis of Exclusion
- Etiology unknown (? Post-viral)
- Males 2:1 predominance
- Treatment is Supportive
- Late Sequelae:
  - Coxa Magna
  - Legg-Calve-Perthes disease
  - Degenerative cystic changes of femoral neck

# Septic Arthritis vs Toxic Synovitis

- Hip is most common joint involved in Septic Arthritis
- There is frequently a Hx of Trauma and or URI
- Most Common etiologies are *S. aureus* and *Strep* species (*H. influenza* is rare now due to Hib vaccine)
- Also get Blood Cultures if Septic Arthritis is considered

# Septic Arthritis vs Toxic Synovitis

	<u>Septic Arthritis</u>	<u>Toxic Synovitis</u>
↑ WBC (>12K)	15K	9K
Refusal to Bear Weight	95%	35%
Fever (>37.5°C)	82%	8%
↑ ESR (20mm)	51mm	21mm

- 3 out of 4 Mandates Aspiration
- Be Wary if Partially Treated w/ Oral Antibiotics


Kocher, et. al | Bone Jt Surg Dec 98

# Conclusion

- Remember Age Specific Diagnosis
- Always Consider Infection and Neoplasm
- Strongly Consider CBC, CRP &/or ESR
- Temp  $\geq 38^{\circ}\text{C}$  ( $100^{\circ}\text{F}$ )/ESR  $>20$  = Tap Hip
- Frog and lateral X-Ray
- Decreased Internal Rotation is Bad

## Question #1

A patient with which one of the following should raise suspicion of septic arthritis?

- 1) ESR of 5mm/hr 
- 2) Temp  $> 37.5^{\circ}\text{C}$  ( $99.5^{\circ}\text{F}$ )
- 3) Bilateral hip pain radiating to the knee
- 4) Bilateral wrist and knee pain

## Question #2

11 yo male with hip pain comes to office, on examination his right hip externally rotates every time you flex his hip. This presentation is most consistent with a diagnosis of:



- 1) Slipped Capital Femoral Epiphysis
- 2) Developmental Dysplasia of the Hip
- 3) Duchene's Muscular Dystrophy
- 4) Juvenile Rheumatoid Arthritis
- 5) Transient Synovitis

## Question #3

- How can you narrow down the work up a patient with a limp?



**0-3 Years**

Septic Hip  
Hip dysplasia  
Occult Fracture  
Length Discrepancy

**4-10 Years**

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GC Arthritis

# Thank You

